

Section 2.1

The Addition Property of Equality

I owe, I owe, so off to work I go!

Average credit-card debt per U.S. household
is going up each year.



Just how much debt is that? And where is that value headed?

In the Exercise Set of this section of your textbook, you will find a mathematical formula that can be used to predict how much debt Americans will be juggling in the future.



First Steps:

- Take comprehensive notes** from your instructor's lecture and insert your notes into this section of the *Learning Guide*. Be sure to write down all examples, definitions, and other key concepts. Additional learning resources include the *Lecture Series on DVD*, the *PowerPoints*, and Section 2.1 of your textbook which begins on page 114.
- Complete the *Concept and Vocabulary Check* on page 120 of the textbook.

Guided Practice:

- Review each of the following *Solved Problems* and complete each *Pencil Problem*.

Objective #1: Identify linear equations in one variable.

✓ *Solved Problem #1*

Identify the linear equations in one variable.

1a. $3x + 7 = 9$

Linear; because the equation is of the form $ax + b = c$, with $a = 3$, $b = 7$, and $c = 9$.

1b. $|x + 2| = 5$

Nonlinear; because of the absolute value bars around x .

1c. $x = 6.8$

Linear; because the equation, which can be written as $1x + 0 = 6.8$, is of the form $ax + b = c$, with $a = 1$, $b = 0$, and $c = 6.8$.

Pencil Problem #1

Identify the linear equations in one variable.

1a. $x - 9 = 13$

1b. $x^2 - 9 = 13$

1c. $\frac{9}{x} = 13$

Objective #2: Use the addition property of equality to solve equations.
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 **Solved Problem #2**

2a. Solve and check: $x - 5 = 12$

$$\begin{aligned}x - 5 &= 12 \\x - 5 + 5 &= 12 + 5 \\x + 0 &= 17 \\x &= 17\end{aligned}$$

The solution set is $\{17\}$.

Check: $x - 5 = 12$
 $17 - 5 = 12$
 $12 = 12$, true

 **Pencil Problem #2** 

2a. Solve and check: $x - 4 = 19$

2b. Solve and check: $z + 2.8 = 5.09$

$$\begin{aligned}z + 2.8 &= 5.09 \\z + 2.8 - 2.8 &= 5.09 - 2.8 \\z + 0 &= 2.29 \\z &= 2.29\end{aligned}$$

The solution set is $\{2.29\}$.

Check: $z + 2.8 = 5.09$
 $2.29 + 2.8 = 5.09$
 $5.09 = 5.09$, true

2b. Solve and check: $7 + z = 11$

2c. Solve: $-\frac{1}{2} = x - \frac{3}{4}$

$$\begin{aligned}-\frac{1}{2} &= x - \frac{3}{4} \\-\frac{1}{2} + \frac{3}{4} &= x - \frac{3}{4} + \frac{3}{4} \\-\frac{2}{4} + \frac{3}{4} &= x \\ \frac{1}{4} &= x\end{aligned}$$

The solution set is $\left\{\frac{1}{4}\right\}$.

2c. Solve: $t + \frac{5}{6} = -\frac{7}{12}$

2d. Solve and check: $8y + 7 - 7y - 10 = 6 + 4$

$$8y + 7 - 7y - 10 = 6 + 4$$

$$y - 3 = 10$$

$$y - 3 + 3 = 10 + 3$$

$$y = 13$$

The solution set is $\{13\}$.

Check: $8y + 7 - 7y - 10 = 6 + 4$

$$8(13) + 7 - 7(13) - 10 = 6 + 4$$

$$104 + 7 - 91 - 10 = 10$$

$$111 - 101 = 10$$

$$10 = 10, \text{ true}$$

2d. Solve and check: $6y + 3 - 5y = 14$

2e. Solve and check: $7x = 12 + 6x$

$$7x = 12 + 6x$$

$$7x - 6x = 12 + 6x - 6x$$

$$x = 12$$

The solution set is $\{12\}$.

Check: $7x = 12 + 6x$

$$7(12) = 12 + 6(12)$$

$$84 = 12 + 72$$

$$84 = 84, \text{ true}$$

2e. Solve and check: $12 - 6x = 18 - 7x$

2f. Solve and check: $3x - 6 = 2x + 5$

$$3x - 6 = 2x + 5$$

$$3x - 2x - 6 = 2x - 2x + 5$$

$$x - 6 = 5$$

$$x - 6 + 6 = 5 + 6$$

$$x = 11$$

The solution set is $\{11\}$.

Check: $3x - 6 = 2x + 5$

$$3(11) - 6 = 2(11) + 5$$

$$33 - 6 = 22 + 5$$

$$27 = 27, \text{ true}$$

2f. Solve and check: $4x + 2 = 3(x - 6) + 8$

Objective #3: Solve applied problems using formulas.**✓ Solved Problem #3**

3. There is a relationship between the number of words in a child's vocabulary, V , and the child's age, A , in months, for ages between 15 and 50 months, inclusive.

This relationship can be modeled by the formula

$$V + 900 = 60A.$$

Use the formula to find the number of words in a child's vocabulary at the age of 50 months.

$$V + 900 = 60A$$

$$V + 900 = 60(50)$$

$$V + 900 = 3000$$

$$V + 900 - 900 = 3000 - 900$$

$$V = 2100$$

At 50 months, a child will have a vocabulary of 2100 words.

✎ Pencil Problem #3

3. The cost, C , of an item (the price paid by a retailer) plus the markup, M , on that item (the retailer's profit) equals the selling price, S , of the item.

This relationship is modeled by the formula

$$C + M = S.$$

For a particular computer, the selling price is \$1850. If the markup is \$150, find the cost to the retailer for the computer.

Answers for Pencil Problems (Textbook Exercise references in parentheses):

1a. linear (2.1 #1) 1b. not linear (2.1 #3) 1c. not linear (2.1 #5)

2a. {23} (2.1 #11) 2b. {4} (2.1 #19) 2c. $\left\{-\frac{17}{12}\right\}$ (2.1 #25)

2d. {11} (2.1 #45) 2e. {6} (2.1 #51) 2f. {-12} (2.1 #53)

3. \$1700 (2.1 #63)

Homework:

- Review the Section 2.1 summary** on page 198 of the textbook.
- Insert your homework** into this section of the *Learning Guide*. Show all work neatly and check your answers. Strive to work through difficulties when possible, making note of any exercises where you need additional help. Remember, even if your instructor assigns homework through *MyMathLab*, you should still write out your work.